illumination, $\Phi 2$ is that of the sighting direction, $\Phi 1$ is that of the focus direction and ΔP is the transverse deformation value at each of the central portions.

77. (Amended) The system according to claim 3, characterized in that for an illumination direction of at least one channel, along which illuminating means receive signals, a deformation correction is made in at least one of the central portions by variation of the phase-shift of $\Delta P\ (2\pi/C)\ (f \cos(\Phi 2) + Fe \cos(\Phi'2) - (f + F) \cos(\Phi 1))$ where f is the earth side frequency, Fe is the measured external translation value of the same sign as F if the frequency changes are in the same direction, F is the total frequency translation, $\Phi 1$ is the angle of incidence of illumination, $\Phi 2$ is that of the sighting direction, $\Phi'2$ is that of the ground focus or opposite focus direction and ΔP is the transverse deformation value at each of the central portions.

cancel

REMARKS

The claims have been amended to eliminate multiple dependency and to improve their format. None of these amendments is believed to involve any new matter. Accordingly, it is respectfully requested that the foregoing amendments be entered, that the application as so amended receive an examination on the merits, and that the claims as now presented receive an early allowance.

Respectfully submitted,

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MARKED-UP REVISIONS

3. (Amended) The system according to [one of claims 1 or 2] claim 1, characterized in that the radiofrequency antenna is substantially flat, the signals passing from one face to the other of said antenna and for at least one channel and in one path direction, it corresponds, to a direction of illumination along which the illuminating means transmit and/or receive signals to and from the antenna, a cone of "self-compensation" sightings to and from the earth defined by a common incidence on the plane of the antenna, called self-compensation incidence (the incidence of a direction being the angle that this direction makes with the normal to the plane of the antenna), the self-compensation sightings being such that the deformations of the antenna transverse to the general plane of the antenna and the attitude errors of the antenna about any axis contained within said plane are substantially without effect on these same signals diverted to or from this self-compensation sighting and of small effect in the neighboring sighting directions.

4. (Amended) The system according to [one of the preceding claims] claim 1, characterized in that each tile includes at least a central portion, unique for a given channel and a path direction, connected by grouping and/or splitting means upstream on the path at at least one signal receiving point and downstream at at least one signal transmitting point and in that means for applying phase-shifting and or delaying between the transmitting and receiving points for ensuring diversion are applied on the central portion with regard to the common delaying and phase-shifting and on the branches with regard to the differential delaying or phase-shifting.

7. (Amended) The system according to [one of the preceding claims] claim 1, characterized in that the antenna includes means for translating the frequency of the signals at the time of their diversion, for at least one channel and one path.

8. (Amended) The system according to [one of the preceding claims] claim 1, characterized in that for at least one channel and at least one path, the signals use the same frequency before and after the antenna.

9. (Amended) The system according to [claims 3 and 8 taken in combination] claim 3, characterized in that for an illumination direction of at least one channel along which illuminating means transmit and/or receive signals to and from the antenna and at least one path direction, the self-compensation incidence is equal to the incidence of the illumination direction.

11. (Amended) The system according to [claims 3 and 10 taken in combination] claim 3, characterized in that for an illumination direction of at least one channel along which illuminating means transmit and/or receive signals to and from the antenna and at least one path direction, the cosine of the self-compensation sighting incidence and the cosine of the illumination direction incidence are substantially in the ratio of the central frequencies of the illumination side and earth side channel.

15. (Amended) The system according to claim [~~10~~7] claim 7, characterized in that the illuminating means comprise a plurality of illuminating sub-assemblies and in that, for a given channel for which the antenna implements a translation frequency, the different signals transmitted to the plurality of illuminating sub-assemblies or originating therefrom are divided along a plurality of transmitting and/or receiving beams toward the earth whose angular geometry seen from the antenna substantially corresponds to the relative angular geometry along which the different sub-assemblies illuminating this channel are seen from the antenna, after multiplication of all the angular differences by the ratio of the central frequencies of the illuminating side and earth side channel, this geometry being modified by an anisotropy where necessary.

16. (Amended) The system according to [claims 12 or 13, possibly taken in combination with claim 15] claim 12, characterized in that the external translation signal used along at least one channel is transmitted by the illuminating means and received by the antenna face which is on the illumination side, and in that in the case where the illuminating means are split into illuminating sub-assemblies, the external translation signal is transmitted by a sub-assembly called a focus, possibly limited to this function.

17. (Amended) The system according to [claims 3 and 16] claim 3, characterized in that for an illumination direction of at least one channel, along which illuminating means transmit signals to the antenna while transmitting the external translation signal, the cosine of the self-compensation incidence and the cosine of the illumination direction incidence are substantially in the ratio (f + F - Fe) / f where f is the earth side frequency, Fe is the value of the external translation, and F is the total frequency translation, and in that in the case where the illuminating means are split into sub-assemblies, the difference in incidence between the illumination in question and the focus is substantially reproduced in the difference between the self-compensation incidences corresponding to the illumination and those that would correspond to the focus, using the multiplying terms (f+F/f) and (sin(Φ1~~2~~)/sin(Φ2~~1~~)) where Φ1 is the illumination incidence angle of the focus and Φ2 the self-compensation incidence angle that would result if the focus transmitted.

19. (Amended) The system according to [one of claims 12 or 13] claim 12, characterized in that an external translation signal used along at least one channel in receiving is received by the tile face along which receiving takes place and is transmitted from a ground point called ground focus.

20. (Amended) The system according to [one of claims 12 or 13] claim 12, characterized in that an external translation signal used along at least one channel in receiving is received by the tile face along which receiving takes place

and is transmitted by at least a satellite substantially in the same orbit as the antenna and the illuminating means, this satellite being arranged in relation to the antenna on the side opposite the illuminating means, the signal transmitting means being called opposite focus.

21. (Amended) The system according to [claim 3 taken in combination with one of claims 19 or 20] claim 19, characterized in that for an illumination direction of at least one channel, along which illuminating means receive signals the self-compensation incidence angle is substantially equal to $\Phi2 + (\cos(\Phi2)\ (f+Fe)-\cos(\Phi1)\ (F+f))\ /\ \sin(\Phi2)\ f$ where $\Phi1$ and $\Phi2$ are the angle of incidence of the illumination direction and that of the external translation signal, f the earth side frequency, Fe is the external translation value, and F is the total frequency translation.

23. (Amended) The system according to [claims 12, 18, 19 and 22 taken in combination] claim 12, characterized in that for at least one channel used in transmitting and in receiving, the frequency Fe is equal to the frequency F for both paths and at least one ground focus is in the neighborhood of a transmission self-compensation sighting corresponding to these illuminating means.

24. (Amended) The system according to [claims 18 and 22 taken in combination with one of claims 19 or 20] claim 18, characterized in that for at least one channel used in transmitting and receiving, the attitude of the antenna, as well as the frequencies Fi and Fe both in transmission and reception, are such that the self-compensation sightings are identical on both paths despite the non-alignment of the opposite focus with the illuminating means used in receiving, or in spite of the distance between the ground focus and the center of the zone to be covered.

25. (Amended) The system according to [claims 3 and 16 in combination] claim 3, characterized in that for an illumination direction of at least one channel,

along which illuminating means receive signals, the translation of frequency Fe is done from the external signal received by the illumination face and the self-compensation incidence is such that cosine ($\Phi 2$)/cosine ($\Phi 1$) = (f +Fe + F)/f where $\Phi 1$ and $\Phi 2$ are the angle of incidence of the illumination direction and the angle of incidence of self-compensation, f being the earth side frequency, Fe the value of the external translation, F the total frequency translation.

28. (Amended) The system according to [claims 18 and 26 in combination] <u>claim 18</u>, characterized in that, for at least one channel used in transmitting and receiving, $|\mathrm{Fe}| = |\mathrm{F}|$ and $\mathrm{Fi}| = 2|\mathrm{F}|$ for receiving and Fe=F for transmitting and in that the self-compensation sightings are substantially the same on both paths.

29. (Amended) The system according to [claims 3 and 16 in combination] <u>claim 3</u>, characterized in that for an illumination direction of at least one channel, along which illuminating means receive signals, the translation Fe is done from the external signal received by the illumination face and is of the same direction as the total translation F, in that F = Fe and in that the self-compensation incidence is given by $\Phi 2 - \Phi 1 = -2 \cot(\Phi 1)$ F/f where $\Phi 1$ and $\Phi 2$ are the angle of incidence of the illumination direction and the angle of incidence of self-compensation, f being the earth side frequency, Fe the value of the translation, F the total frequency translation.

31. (Amended) The system according to [claim 3 taken in combination with one of claims 12 or 13] <u>claim 12</u>, characterized in that the attitude and the translation frequency or frequencies Fe or Fi are such that the angular difference between all the possible sightings and the self-compensation sightings are globally minimized.

32. (Amended) The system according to [claims 3 taken in combination with one of claims 12 or 13] claim 12, characterized in that the attitude and the translation frequency or frequencies Fe or Fi are such that the self-compensation residues are spread over both paths.

34. (Amended) The system according to [claims 1 and 5 taken in combination] claim 1, characterized in that the phase-shifting and/or delaying means are controlled so as to keep the orientation of a beam corresponding to a channel unchanged in the reference frame associated with the antenna in spite of modifications to the orientation of the illumination direction used by the beam in the reference frame associated with the antenna.

35. (Amended) The system according to [claim 34 taken in combination with one of claims 14 or 15] claim 34, characterized in that the phase-shifting and/or delaying means are controlled so as to keep the orientation unchanged in the reference frame associated with the antenna, of a possibly virtual beam direction corresponding to a possibly virtual illumination direction referenced with respect to the illumination directions of a channel.

40. (Amended) The system according to [claims 38 and 39 taken in combination] claim 38, characterized in that the orientation of the illumination direction in the reference frame associated with the antenna is determined based on knowing the attitude of the antenna and the orientation of the axis joining them, in the earth reference frame.

42. (Amended) The system according to [claims 39 and 41 taken in combination] claim 39, characterized in that the yaw and/or pitch attitude of the antenna is determined based on knowledge of the orientation in the antenna-related reference frame of the direction of arrival of the signal or signals and of the orientation in the earth reference frame of this arrival direction.

44. (Amended) The system according to [claims 35 and 41 taken in combination] claim35, characterized in that the referenced virtual illumination direction is that of an illuminating sub-assembly, which transmits the measurement signal, and in that the measurement immediately gives the information needed for compensation.

46. (Amended) The system according to [claims 14 or 15] claim 14, characterized in that illuminating sub-assemblies are offset from one another in a common orbit.

47. (Amended) The system according to [one of claims 14 or 15] claim 14, characterized in that orbits of illuminating sub-assemblies have differences in ellipticity and/or orbital plane.

52. (Amended) The system according to [claims 6 and 7] claim 6, characterized in that the frequency translation is implemented, on at least one channel and one path, in the central portion.

53. (Amended) The system according to [one of claims 14 or 15] claim 14, characterized in that, in one telecommunications transmission application, it comprises a plurality of channels, together with a plurality of illuminating sub-assemblies, the beam mosaic on the ground consisting of the fine pattern generated by the antenna due to the angular geometry along which the illuminating sub-assemblies are seen by it, repeated along a wide pattern that is generated by the antenna due to the different channels.

54. (Amended) The system according to [claims 53 and 47] claim 53, characterized in that the illuminating sub-assemblies illuminating the same channel are seen from the antenna according to a relatively stable angular geometry except for a rotation about itself at the orbital period and in that the plurality of directions

ensured by the wide pattern of the channel precesses thanks to the phase-shifting and/or delaying means around a central direction and this in phase with the rotation of the fine pattern so that the mosaic of all the beams keeps a stable structure, apart from a rotation about itself on the orbital scale.

56. (Amended) The system according to [claims 55 taken in combination with claim 46] claim 55, characterized in that the phase shifts and delays are such that the offset of the illuminating sub-assemblies is expressed by beams with ground footprints offset transversely with respect to the track.

60. (Amended) The system according to [one of claims 57 to 59] claim 57, characterized in that one antenna satellite bears illuminating means for another antenna satellite.

70. (Amended) The system according to [claims 67 and 55 taken in combination] claim 67, characterized in that the antenna is extended along the yaw axis.

71. (Amended) The system according to [one of the preceding claims] claim 67, characterized in that the antenna has means for measuring or reconstructing the deformation (ΔP) transverse to the plane of the antenna.

73. (Amended) The system according to [claims 3, 5, 8 and 71] claim 3, characterized in that for an illumination direction of at least one channel along which illuminating means transmit and/or receive signals to and from the antenna and at least one path direction, a deformation correction is made by variation of the phase-shift value ΔP $(2\pi f/C)$ $(\cos(\Phi 2)- \cos(\Phi 1))$ in at least one of the central portions, where $\Phi 1$ is the angle of incidence of illumination, $\Phi 2$ is that of the sighting direction, f is the earth side and illumination side frequency, and ΔP is the transverse deformation value at each of the central portions.

74. (Amended) The system according to [claims 3, 5, 10 and 71] <u>claim 3</u>, characterized in that for an illumination direction of at least one channel along which illuminating means transmit and/or receive signals to and from the antenna and at least one path direction, a deformation correction is made by variation of the phase-shift of value ΔP $(2\pi f/C)$- f1 $(\cos(\Phi 2)$- $\cos(\Phi 1))$ in at least one of the central portions, where $\Phi 1$ is the angle of incidence of illumination, $\Phi 2$ is that of the sighting direction, f2 and f1 are the earth side and illumination side frequencies, and ΔP is the transverse deformation value at each of the central portions.

75. (Amended) The system according to [claims 3, 5, 16 and 71] <u>claim 3</u>, characterized in that for an illumination direction of at least one channel, along which illuminating means transmit signals to the antenna, a deformation correction is made by variation of the phase-shift of ΔP $(2\pi/C)$ (f cos(2)- (f+ F) $\cos(\Phi 1)$ + Fe $\cos(\Phi' 1))$ in at least one of the central portions, where f is the earth side frequency, Fe is the measured external translation value of the same sign as F if the frequency changes are in the same direction, F is the total frequency translation, $\Phi 1$ is the angle of incidence of illumination, $\Phi 2$ is that of the sighting direction, $\Phi' 1$ is that of the focus direction, ΔP is the transverse deformation value at each of the central portions.

76. (Amended) The system according to [claims 3, 5, 16 and 71] <u>claim 3</u>, characterized in that far an illumination direction of at least one channel, along which illuminating means receive signals, a deformation correction is made in at least one of the central portions by variation of the phase-shift of ΔP $(2\pi/C)$ (f $\cos(\Phi 2)$- (f+ F) $\cos(\Phi 1)$ - Fe $\cos(\Phi' 1))$ where f is the earth side frequency, Fe is the measured external translation value of the same sign as F if the frequency changes are in the same direction, F is the total frequency translation, $\Phi 1$ is the angle of incidence of illumination, $\Phi 2$ is that of the sighting direction, $\Phi' 1$ is that of

the focus direction and ΔP is the transverse deformation value at each of the central portions.

77. (Amended) The system according to [claims 3, 5 and 71, taken in combination with one of claims 19 or 20] <u>claim 3</u>, characterized in that for an illumination direction of at least one channel, along which illuminating means receive signals, a deformation correction is made in at least one of the central portions by variation of the phase-shift of $\Delta P\ (2\pi/C)\ (f \cos(\Phi 2) + Fe \cos(\Phi'2) - (f+F) \cos(\Phi 1))$ where f is the earth side frequency, Fe is the measured external translation value of the same sign as F if the frequency changes are in the same direction, F is the total frequency translation, $\Phi 1$ is the angle of incidence of illumination, $\Phi 2$ is that of the sighting direction, $\Phi'2$ is that of the ground focus or opposite focus direction and ΔP is the transverse deformation value at each of the central portions.